

[0020] FIG. 3E depicts a fourth alternative example of the key assembly of FIG. 3A.

[0021] FIG. 4 depicts a second example cross-sectional view of a key assembly of the keyboard of FIG. 1, taken along line A-A of FIG. 1.

[0022] FIG. 5 depicts an alternative example of the key assembly of FIG. 4.

[0023] FIG. 6 depicts a third example cross-sectional view of a key assembly of the keyboard of FIG. 1, taken along line A-A of FIG. 1.

[0024] FIG. 7 depicts a fourth example cross-sectional view of a key assembly of the keyboard of FIG. 1, taken along line A-A of FIG. 1.

[0025] FIG. 8A depicts a fifth example cross-sectional view of a key assembly of the keyboard of FIG. 1, taken along line A-A of FIG. 1.

[0026] FIG. 8B depicts a first alternative example of the key assembly of FIG. 8A.

[0027] FIG. 8C depicts a second alternative example of the key assembly of FIG. 8A.

[0028] FIG. 8D depicts a third alternative example of the key assembly of FIG. 8A.

[0029] FIG. 8E depicts a fourth alternative example of the key assembly of FIG. 8A.

[0030] FIG. 8F depicts an isometric view of the key cap and guard structure of the key assembly of FIG. 8A with other components removed for clarity.

[0031] FIG. 9A depicts a sixth example cross-sectional view of a key assembly of the keyboard of FIG. 1, taken along line A-A of FIG. 1.

[0032] FIG. 9B depicts an isometric view of the key cap and guard structure of the key assembly of FIG. 9A with other components removed for clarity.

[0033] FIG. 10A depicts a seventh example cross-sectional view of a key assembly of the keyboard of FIG. 1, taken along line A-A of FIG. 1.

[0034] FIG. 10B depicts an alternative example of the key assembly of FIG. 10A.

DETAILED DESCRIPTION

[0035] Reference will now be made in detail to representative embodiments illustrated in the accompanying drawings. It should be understood that the following descriptions are not intended to limit the embodiments to one preferred embodiment. To the contrary, it is intended to cover alternatives, modifications, and equivalents as can be included within the spirit and scope of the described embodiments as defined by the appended claims.

[0036] The description that follows includes sample systems and apparatuses that embody various elements of the present disclosure. However, it should be understood that the described disclosure may be practiced in a variety of forms in addition to those described herein.

[0037] The following disclosure relates to keyboards and/or other input devices that include mechanisms that prevent and/or alleviate contaminant ingress. These mechanisms may include keyboard membranes or gaskets; structures such as brushes, wipers, or flaps in gaps between key caps of the keys; funnels, skirts, elastomer or other bands, or other guard structures coupled to key caps; bellows that blast contaminants with forced gas; and/or various active or passive mechanisms that drive contaminants away from the keyboard and/or prevent and/or alleviate contaminant ingress into and/or through the keyboard.

[0038] These and other embodiments are discussed below with reference to FIGS. 1-10B. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these Figures is for explanatory purposes only and should not be construed as limiting.

[0039] FIG. 1 depicts an electronic device 100 including a keyboard 102. The keyboard 102 includes keys or key assemblies with key caps 103 or actuators that move within apertures defined in a web 104. The electronic device 100 includes one or more mechanisms that prevent and/or alleviate contaminant ingress into and/or through the keyboard 102, such as between the key caps 103 and the web 104. Contaminants may include liquids (e.g., water, soft drinks, sweat, and the like), solids (e.g., dust, dirt, food particles, and the like), and/or any foreign material that may ingress into and/or through the keyboard 102.

[0040] As described in detail below, one or more various contaminant ingress prevention and/or alleviation mechanisms may be used in one or more embodiments. In some embodiments, the keyboard 102 may include a membrane, gasket, or similar component that blocks contaminant ingress. Structures such as brushes, wipers, or flaps may block gaps around key caps 103 or other actuators in various embodiments. In numerous embodiments, funnels, skirts, elastomer or other bands, or other guard structures coupled to each of the key caps 103 may block contaminant ingress into and/or direct contaminants away from areas under the key caps 103. Bellows mechanisms may blast contaminants with forced gas in some embodiments, such as out from around key caps 103, into cavities in a substrate of the keyboard 102, and so on. In various embodiments, the key caps 103 may contact surrounding structures to block gaps around the key caps 103. In still other embodiments, various active or passive mechanisms may drive contaminants away from the keyboard 102 and/or prevent and/or alleviate contaminant ingress into and/or through the keyboard 102.

[0041] FIG. 2 depicts an example exploded view of the keyboard 102 or keyboard assembly of FIG. 1. In this example, the keyboard 102 includes a web 104 that fixes a membrane 213, gasket, or the like to a substrate 216, base, foundation, or the like (e.g., a printed circuit board). Keys or key assemblies include movement mechanisms 215 coupled to the substrate 216, inner key caps 214 or actuators coupled to the movement mechanisms 215 on an internal side of the membrane 213, and key caps 103 or actuators disposed in apertures 210 defined by the web 104 on an external side of the membrane 213. The movement mechanisms 215 moveably couple the inner key caps 214 and the key caps 103 to the substrate 216. Key assemblies may also include one or more activation mechanisms (such as one or more switches, capacitive sensors, optical sensors, and the like, which may be included with the movement mechanisms 215) that detect touch to and/or movement of the key caps 103.

[0042] The web 104 may be coupled to the substrate 216 using attachment connectors 211 that engage attachment points 217 defined in the substrate 216. For example, the attachment connectors 211 may be screws, bolts, or the like and the attachment points 217 may be threaded apertures and so on. The attachment connectors 211 pass through the membrane 213, coupling the membrane 213 to the web 104 and the substrate 216. Thus, the membrane 213 may not be coupled to the web 104 and/or the substrate 216 at every point where the membrane 213 is fixed to the substrate 216 by the web 104 (e.g., where the web 104 and/or the substrate